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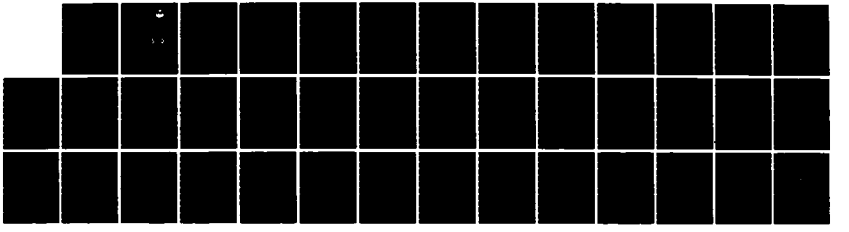

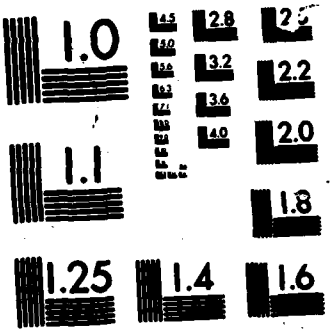

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USAFOEHL REPORT

86-002EQ139ASC

AD-A165 656

TRAVIS WASTEWATER SURVEY
TRAVIS AFB CA

ROBERT D. BINOVI, MAJOR, USAF, BSC
FRANCIS E. SLAVICH, 2LT, USAF, BSC

January 1986

Final Report

USAF Occupational and Environmental Health Laboratory
Aerospace Medical Division (AFSC)
Brooks Air Force Base, Texas 78235-5501

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This report has been reviewed and is approved for publications.

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UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

AD A165 656

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS N/A
2a. SECURITY CLASSIFICATION AUTHORITY N/A	3. DISTRIBUTION/AVAILABILITY OF REPORT Distribution is unlimited. Approved for public release.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) USAFOEHL Report No. 86-002EQ139ASC	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION USAF Occupational and Environmental Health Laboratory 6b. OFFICE SYMBOL (If applicable) ECQ	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) Brooks AFB TX 78235-5501	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Same as 6a 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO / WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
Travis AFB Wastewater Survey (U)

12. PERSONAL AUTHOR(S)
Maj Robert D. Binovi; 2Lt Francis E. Slavich

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
Final	FROM 6 Aug 85 TO 11 Aug 85	January 1986	57

16. SUPPLEMENTARY NOTATION

17 COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP	CA	Wastewater	Influent
			COD	Separators	Oil/Water
			O&G	Effluent	Travis AFB

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

USAFOEHL conducted an on-site wastewater quality survey at Travis AFB CA from 6-11 Aug 85 at the request of 60 ABG/DEE. The survey was requested to characterize the influent and effluent from the installation's oil/water separators to determine if they require permits under the Resource Conservation and Recovery Act (RCRA). All samples were analyzed for pH, chemical oxygen demand (COD), and Oil and Grease (O&G). Samples taken from industrial areas were additionally analyzed for EPA volatile halocarbons, volatile aromatics, and metals by the ICP metals screen. Sampling results were evaluated against the following criteria: (1) Pretreatment Standards for Existing Sources, 40 CFR Part 433--Metal finishing point source category, (2) 50 CFR 260 Resource Conservation and Recovery Act and the California Hazardous Waste Control Act, and (3) Fairfield-Suisun Sewer District Wastewater Discharge Ordinance No. 9, Section 2.09--Limitations on Wastewater Strength. Twelve sample sites had one or more parameters exceeding the limitations set forth by the preceding criteria. Recommendations were: (1) Hazardous wastes or water used to rinse off hazardous wastes should not be discharged int
(over)

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT	21 ABSTRACT SECURITY CLASSIFICATION	
☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS	Unclassified	
22a NAME OF RESPONSIBLE INDIVIDUAL FRANCIS E. SLAVICH, 2Lt, USAF, BSC	22b. TELEPHONE (Include Area Code) (512) 536-2891	22c OFFICE SYMBOL USAFOEHL/ECQ

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Item 19. (Cont.)
the separator/sewage collection system; (2) the oil/water separators listed in Appendix 5, Travis AFB Hazardous Waste Management Plan, should not be considered as hazardous waste treatment units; (3) the tanks at Bldg P-18 should be considered as hazardous waste storage facilities; (4) the 30 May 85 Travis AFB Hazardous Waste Management Plan should be changed to include the preceding recommendations; (5) Civil Engineering and Bioenvironmental Engineering Sections need to coordinate in establishing schedules for routine monitoring and servicing of the separators; (6) additional sampling at Bldgs P-18, 560, and the last manhole in the 800 area before the wastewater leaves the base should be conducted to complete the data set in this report; and (7) the high level of mercury at the lift station should be confirmed by additional sampling, and appropriate action taken based on the results.

ACKNOWLEDGMENTS

The authors would like to express their appreciation for the support of SrA Tammy Johnson, A1C Peter Davis, and A1C Ross Simmons, technicians, USAFOEHL/ECQ, and Mr Arturo Riojas in accomplishing this survey.

TABLE OF CONTENTS

I. INTRODUCTION

A. Travis AFB is located in Solano County, California. The base is situated within the city limits of Fairfield, which is approximately 53 miles northeast of San Francisco, and 42 miles Southwest of Sacramento. The city of Suisun is contiguous to Fairfield. The primary mission of the base is to provide military airlift force and support for MAC's Pacific system of 37,000 nautical miles of military air routes. The base's oil/water separators discharge to the sanitary sewer system. The wastewater effluent flows to the Fairfield-Suisun regional Publicly Owned Treatment Works (POTW) from two locations, a main servicing the 800 area and a main from the rest of the base.

B. The State of California Department of Health Services (see Appendix A) determined that the installation's oil/water separators are considered hazardous waste treatment units. As such, the separators may be required to have permits under the Resource Conservation and Recovery Act (RCRA). To determine if permits will be required for the separators, the base was asked to submit test results on the chemical composition of the influent and effluent of the separators. The 60 ABG/DEE requested USAFOEHL conduct a survey to characterize the influent and effluent from the oil/water separators. The survey was conducted from 6-11 Aug 1985 by USAFOEHL/ECQ personnel.

II. SAMPLING METHODOLOGY

A. Samples were taken from 24 locations, including the discharge point of 20 separators. Sampling locations are shown in Appendix B. Base personnel were uncertain whether the Building P-18 separator/holding tank discharged into the sanitary sewer. The tank was sampled at the apparent point of discharge into an adjacent holding tank as identified in the Travis Hazardous Waste Management Plan.[3] The separator at the Fire Station, Building 560, was not sampled because the discharge sewer from the separator was clogged, and base personnel could not service the line in time. Samples were conducted from the building sewer. Twenty-four hour composite samples were taken at Buildings 60, S41, 808, 811, and 1032 with either the Isco model 2100 or model 1680 wastewater samplers. Grab samples were substituted for composite samples at the other locations because there was little or no flow (see Appendix B). Volatile halocarbon and aromatics were obtained by grab sampling at all locations to prevent loss of these parameters through compositing.

B. All samples were analyzed for pH, chemical oxygen demand (COD), and oil and grease (O&G). Samples taken from industrial areas were additionally analyzed for EPA volatile halocarbons and volatile aromatics and metals by the ICP metals screen. Parameters analyzed for are shown in Appendix C.

C. COD analysis was performed on site using Hach reagents and the Hach DREL 5 spectrophotometer. Three standards of known concentration (100 mg/l, 200 mg/l, 300 mg/l) and four distilled, deionized water blanks (2 high range, 2 low range) were analyzed to prepare a calibration curve. The concentration of the unknown samples was determined by linear regression. The pH was measured on site with a Hach model 19200 pH meter. The remaining analyses were completed by the USAFOEHL Analytical Services Division.

D. Typical representative flow rates for separators receiving little or no flow were determined by measuring the flow from one or two ½-inch rubber hoses simulating actual conditions.

E. At separators with flow, the flow was measured directly by timing the collection of a known volume. Theoretical and measured residence times for each unit were calculated from flow measurements and separator dimensions.

III. RESULTS

A. Three criteria could possibly be used to evaluate the results of the survey: (1) Pretreatment Standards for Existing Sources, 40 CFR Part 433--metal finishing point source category (includes the operations of painting, solvent degreasing, paint stripping, etc.); (2) 40 CFR 260 Resource Conservation and Recovery Act and the California Hazardous Waste Control Act; and (3) the Fairfield-Suisun Sewer District Wastewater Discharge Ordinance No. 9, Section 2.08--Limitations on Wastewater Strength (see Appendixes D and E).

B. Sampling:

1. Results from the metals analyses were compared to the Limitations on Wastewater Strength under Section 2.08.1 of the Fairfield-Suisun Sewer District Wastewater Discharge Ordinance No. 9. In addition, 12 sample sites were compared to the Pretreatment Standards for Existing Sources (PSES) in 40 CFR Part 433--metal finishing point source category (see Appendix C).

2. Nine sample sites had one or more parameters exceeding the PSES and/or the limitations of Section 2.08.1 of Ordinance No. 9 (see Appendix F).

3. Levels of mercury, approximately 270 times greater than the Fairfield-Suisun limit of .01 mg/l, were found at the sewer system lift station. The PSES limit for lead of 0.69 mg/l was exceeded at four locations; the auto hobby shop, vehicle wash rack, P-18, and Bldg 919. Two sites, the P-18 tank and Bldg 808, exceeded the PSES limit of 2.13 mg/l for Total Toxic Organics (TTO), even though not all the toxic organics listed in 40 CFR 433.11 were analyzed for (see Appendix G). Both PSES and Ordinance No. 9 limitations for silver and chromium were exceeded at Bldg 810 and the P-18 tank. Finally, cadmium concentrations at Bldg S41, the engine test cell, and Bldg 919 exceeded the Section 2.08.1 limitations of .20 mg/l.

4. Volatile halocarbons and aromatics found at each sampling site are listed in Appendix H, along with their respective concentrations. Methylene chloride was the most common volatile found at 12 sites. The Ordinance No. 9 limit set for chlorinated hydrocarbons is 0.02 mg/l (20 µg/l). Concentrations of methylene chloride exceeding this concentration were found in the separators at Bldgs 811, 1001, P-18, and the sewage lift station. Concentrations of other chlorinated hydrocarbons exceeding 0.02 mg/l were found at Bldg 1202 (1,4-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene), Bldg 809 (chloroform, 1,1,1-trichloroethane), Bldg 1001 (benzene), and Bldg P-18 (chlorobenzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene).

5. Analytical results for pH, COD, and O&G are included in Appendix I. Four samples were mistakenly preserved with sulfuric acid before pH readings were taken, thus preventing any chance for measurement. According to Section 2.08.2 of Ordinance No. 9, no sample can have a pH of less than 6.0. Only the sample from Bldg 919 exceeded this criterion. The remaining 19 sites had values well within the pH limit.

6. A limit for O&G is not included in the PSES for paint preparation; however, Section 2.08.2 of Ordinance No. 9 prohibits discharges containing more than 100 mg/l of O&G of mineral or petroleum origin. Six sites exceeded the O&G limits. These sites were: the wash rack at the motor pool, AGE wash rack, auto hobby shop, engine test cell, Bldg 811, and Bldg 919. The O&G sample at the P-18 tank was broken enroute to Brooks AFB.

7. COD, like O&G, is an indicator for organic contamination. Although there is no limit established for COD in either the PSES or Ordinance No. 9, concentrations higher than 450 mg/l can be used as an indication of contamination from nondomestic sources. Separators at the old wash rack at the motor pool, AGE wash rack, auto hobby shop, Bldg 1202, vehicle wash rack, the test cell, and Bldg 919 exceeded this value, indicating the presence of solvents, oils, grease, etc.

C. Oil/Water Separators:

Measurements of each separator along with design (Stokes formula) and actual detention times are shown in Appendix J. A representative rise velocity (V) was calculated using the Stokes formula:[7]

$$V = g*d**2*(S-1)/18*v$$

In this equation: d = the diameter of the oil droplet,
v = the kinematic viscosity,
S = the specific gravity of the oil, and
g = 32.2 ft/sec**2

The value assigned for the droplets' diameter was 150 microns.[5] The value chosen for kinematic viscosity was 9.829**2 ft**2/second.[1] The range for the design detention time was calculated by choosing an upper and lower value for the specific gravity. These corresponded to .751 for JP-4 and .935 for industrial gear oil.[6] These values typically represent the range of design conditions, as the gravity separation of oil from water occurs faster with oils of lower specific gravities. Comparison of design and actual times show that, in general, actual detention times easily exceeded times required for the higher specific gravity oils under the specified flow; however, detention times at five separators may not be long enough to separate the heavier oil. These sites were: tire repair shop at the motor pool, area car wash at Bldg 1300, base car wash at Bldg 619, Bldg 919, and fuel system repair at Bldg 551.

IV. CONCLUSIONS

A. Several sites had concentrations of metals greater than allowable under Section 2.08.1 of Ordinance No. 9. All these sites discharge to the building 60 lift station except for the separator at Bldg 810. For the sites that do discharge to the lift station, metals concentrations would not be expected to adversely affect the Fairfield-Suisun POTW because metals analysis at the lift station indicated nondetectable concentrations for every metal except mercury. This tends to indicate that the amount of dilution in this branch of the sewer system is sufficient to prevent them from inhibiting the regional POTW. The discharge point from the 800 area was not monitored; however, the concentration of silver found was below the 5 mg/l concentration inhibitory to aerobic wastewater treatment processes.[6] Since mercury was found only at the lift station, it must have originated from an another source, probably the dental clinic. The extremely high level of mercury could definitely have an adverse impact on the Fairfield POTW's biological treatment processes. Of the four PSES parameters which were exceeded, lead was exceeded most often, with the separators at Buildings 226, 1202, 919, and the tank at P-18 exceeding the 0.69 mg/l limit. Lead can enter the sewer when paint, stripped with solvent, is washed off the surface with water.

B. The major contributors to the two TTO exceedences at the P-18 lot and Bldg 808 were methylene chloride and tetrachloroethylene. This was probably again due to paint stripping operations. Paint stripping may also be responsible for the exceedence of chromium at the P-18 lot. The high silver concentration at Hangar 810, Site 0067, can also be accounted for from paint stripping operations.

C. Building 919 was the only site to have a pH reading lower than the criterion of 6.0. In addition, this site recorded a lead concentration of 2.79 mg/l which could indicate that battery acid was discharged to the sewer system at this point.

D. The elevated COD and O&G levels found at several sites should not pose a problem to the POTW. Analyses at the sewer system lift station produced readings of 200 mg/l and 38.8 mg/l for COD and O&G, respectively. These values are well within the expected range for domestic wastewater.[5]

E. Gravity separators operate because of solubilities and differences in specific gravities. Soluble and slightly soluble substances, such as methylene chloride, would not be expected to be separated in the separator, but would pass through in concentrations approaching its limit of solubility. Insoluble or even slightly soluble substances with specific gravities greater than one would be expected to form a sludge at the bottom of the separator (i.e., sand, specific gravity = 2.65). Substances with specific gravities less than one will be retained by separating from the water to form a floating layer.

F. A comparison of the design detention time ranges with actual values indicates that most oil/water separators are adequately designed to separate even the heaviest oils under the specified flow conditions. Exceptions to this assumption are the separators at the tire repair shop Bldg 141, housing area car wash Bldg 1300, base car wash Bldg 619, aerial port Bldg 919, and fuel system repair Bldg 551, which failed to meet the design retention time

requirement for the heaviest oils. Of these, the aerial port separator was the only site to have a parameter exceed the PSES or the limits for O&G. The ability of any separator to actually retain or pretreat a wastewater stream containing other organic chemicals can be estimated from the values of solubility and density (specific gravity) in Appendix K.

V. RECOMMENDATIONS

A. Hazardous wastes or water used to rinse off hazardous wastes should not be disposed into the separator/sewage collection system. The separator/sewage collection system may receive only those hazardous wastes considered as "de minimus" losses (i.e., spills, leaks, sampling, etc.). Refer to 40 CFR 261.3 for a more complete description of "de minimus" losses.

B. The oil/water separators listed in Appendix 5, Travis Air Force Base Hazardous Waste Management Plan, should not be considered as hazardous waste treatment units because they should not be receiving hazardous waste. They should be treating industrial wastewater point source discharges subject to regulation under Section 402 of the Clean Water Act, as set out in Fairfield-Suisun Sewer District Wastewater Discharge Ordinance No. 9. Even if waste oil is considered a hazardous material in California, the oil/water separators are not treating a hazardous waste, but treating the "de minimus" losses from aircraft and vehicle system leaks. However, the oil that is collected should be handled as a hazardous waste. No draining of oil from engine sumps or solvents directly into the sewer/separator should be permitted.

C. The tanks at Bldg P-18 should be considered as hazardous waste storage facilities. The contents of these tanks are hazardous waste. Gravity separation is not an adequate pretreatment to render the contents nonhazardous. No discharge into the sewer system should be permitted. Presently, with no provision for proper pretreatment, the contents should be disposed of as hazardous waste.

D. The 30 May 85 Travis Air Force Base Hazardous Waste Management Plan should be changed to include the recommendations of the preceding paragraphs.

E. Civil Engineering and Bioenvironmental Engineering Sections need to coordinate in establishing schedules for routine monitoring and servicing of separators. The schedule should be incorporated into the Base Supplement to AFR 19-7, Environmental Pollution Monitoring. Each separator should be checked monthly. The amount of oil contained in the separator can be ascertained with a rod. The oil should be removed if more than 3-4 inches of oil is found. The BEE section should continue to obtain grab samples quarterly at these locations for at least the parameters shown in Appendix E for a period of one year, to establish a baseline. Operations found disposing chemicals in excess of these limits should be changed to comply with Ordinance No. 9. For reasons already discussed (sample breakage, lab error), additional sampling at Bldgs P-18, 560, and at the last manhole in the 800 area before the wastewater leaves the base, should be conducted to complete the data set in this report.

F. The high level of mercury at the lift station should be confirmed by additional sampling. If these high levels represent continuing disposal practices, the source of mercury must be identified and this method of disposal stopped. Help in identifying possible sources of mercury, other than the obvious ones (i.e., the dental clinic and PMEL), may be found from the Base Supply Issue Exception Code System.

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1. Bolz, Ray E. and Tuve, George L. (eds.) Handbook of Tables for Applied Engineering Science, Chemical Rubber Co., Cleveland OH (1970).

2. Carter, Beth R. (ed.), "Code of Federal Regulations, Title 40, Part 260-Hazardous Waste Management System: General", U.S. Government Printing Office, Washington DC (1 July 1984).

3. Department of the Air Force, "Travis Air Force Base Hazardous Waste Plan", 60th Air Base Group, Travis AFB CA (30 May 1985).

4. Department of Defense, Document MIL-J-5624E "Military Specification for Jet Fuel, Grades JP-3, JP-4, and JP-5", Republican Press, Hamilton OH (23 March 1960).

5. Eckenfelder, W. Wesley Jr., Principles of Water Quality Management, CBI Publishing Co. Inc., Boston MA (1980).

6. Environmental Protection Agency, Document EPA-43019-76-017, "Federal Guidelines for State and Local Pretreatment Programs", U.S. EPA Office of Water Program Operations, Washington DC (1977).

7. Morris, Henry M. and Wiggert, James M., Applied Hydraulics in Engineering, John Wiley and Sons Inc., New York NY (1972).

8. State of California, "California Administrative Code, Title 22, Social Security, Division 4, Environmental Health, Chapter 30--Minimum Standards for Management of Hazardous and Extremely Hazardous Wastes" in the "Environment Reporter", Bureau of National Affairs, Inc., Washington DC (2 March 1985).

APPENDIX A

State of California

Department of Health Services Letter

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF HEALTH SERVICES
TOXIC SUBSTANCES CONTROL DIVISION
NORTHERN CALIFORNIA SECTION
4250 POWER INN ROAD
SACRAMENTO, CA 95826
(916) 739-3145

April 22, 1985
Certified # P 371 243 909

Colonel Donald Wolfswinkel
Base Commander
60 ABG/CC
Travis Air Force Base, Ca. 94535

Dear Colonel Wolfswinkel:

TRAVIS AIR FORCE BASE, OPERATION PLAN REVIEW EPA ID # CA5570024575

The Department has received and completed its review of Travis Air Force Base Operation Plan (OP) dated March 21, 1985. The review focused on the drum storage area in Building 1365 and the PCB storage area in Building 956. Although, several minor deficiencies were identified during the review, the revised OP contains the complete information regarding the drum storage area in Building 1365 and the PCB storage facility in Building 956.

The enclosed Operation Plan Comments and Compliance Schedule identify the deficiencies and time frame for submittal of information regarding other operations at Travis that require a permit.

Please review the comments and submit all the necessary information by May 30, 1985 or within 14 days following each item on the Compliance Schedule. Please submit two copies of each response to the comments and an original signed certification.

If you have any comments or questions, please contact Watson Gin at (916) 739-2829.

Sincerely,

Randy Marx, P. E.
Senior Engineer

WG:am

Enclosure

cc: Mr. Martin Kurtovich, RWQCB, Oakland
Mr. Richard Luthy, Fairfield-Suisun Sewer District, Suisun City
Mr. John Masterman, PMS-TSCD, Sacramento
Mr. Mark Sandy, Travis AFB

OPERATION PLAN COMMENTS
TRAVIS AIR FORCE BASE
EPA ID # CA5570024575
APRIL 4, 1985

PO Page No.	COMMENTS
6	The certification should contain the language as stated in Section 66373, Title 22, CAC, which is as follows: "I certify under penalty of law that documents and all attachments were prepared under the direction or supervision in accordance with a system designed to assure that the qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."
A-1	The full names and title of each person referenced on page A-1 should be provided.
B-1	Figures 1, 2, 17, 21, 32 and 39 need to be submitted.
B-2	The revised OP should indicate that all oil/water separators need to be permitted, since there is treatment of waste streams by separators. Permits will not be required if the waste streams are not hazardous.
C-1	The source of Figure 5, which shows the depth to groundwater, should be provided in the discussion or on the figure.
E-2-1	All the waste streams generated at Travis AFB, except for containers, and asbestos pipe insulation, should be sampled and analyzed in accordance with the methods referenced in Article 11, Chapter 30, Title 22, CAC. Please provide estimates of the wastes generated on a monthly and annual basis.
F-1-4 F-2-2 F-3-3	The certification regarding the design and construction needs to be signed by a professional engineer registered in California.
E-2-2 B-2	The discussions regarding Buildings 550 and 905 do not indicate if these facilities are proposed or existing. There is no discussion regarding these facilities in Annex F, including Building 956.
F-1-1	Where is the figure that shows examples of the labels?

(13)

Please clarify in the revised OP whether these facilities are proposed and whether Travis is seeking permits for the facilities at this time.

F-7-1 The discussion on the various accumulation points need to provide more detail as to how the wastes are stored (inside or outside), how long the wastes are stored after the drums are filled (the maximum is 72 hours), how many drums, including waste type, are to be stored at anyone time at each accumulation point, and what type of material is the drums stored on.

H-4 All tanks need to be inspected at least annually. The inspections, at a minimum, should include a visual inspection and testing for the tank shell thickness. Inspections for underground tanks must comply with the requirements of Subchapter 16, Title 23, CAC. Analytical data regarding the chemical and physical characteristics of all wastes generated at Travis needs to be included in the revised OP, except for those wastes which are treated by oil/water separators.

Please submit the Oil and Hazardous Substances Pollution Contingency Plan, Petroleum Products Management Plan, and a description of the "primary Crash net."

F-3-3 Please identify who are the emergency coordinators for Travis AFB and discuss their availability in case of an emergency.

Watson Gin

Watson Gin

4/18/85

Date

(14)

COMPLIANCE SCHEDULE

The following Compliance Schedule must be met:

1. July 15, 1985, submit descriptions and drawings that show the location and dimensions of all oil/water separators.

2. August 1, 1985—submit test results on the chemical composition of the influent and effluent from all the oil/water separators.

3. July 15, 1985—submit the revised Training Program.

4. September 1, 1985—submit the procedures that will ensure all underground tanks, sumps, and oil/water separators that require permits, will be in compliance with Subchapter 16, Title 23, CAC.

5. August 1, 1985—submit final study on the depth to groundwater and Travis potential to be located in a 100-year flood plan.

6. July 15, 1985—submit a more detailed discussion regarding the neutralization process at the Battery Shop. The discussion, at a minimum, the initial neutralization process, how the amount of baking soda used in both neutralization process is determined, how often baking soda is added, the rationale for only quarterly pH testing instead of daily or weekly pH testing, the criteria an acceptable pH of the effluent and the compatibility of the materials of construction of all containment structures and piping to the battery acid.

7. July 15, 1985—submit a more detailed discussion on the operations of Building 905, Entomology Shop, including the types of pesticides and herbicides used, the amount of waste generated monthly, and the time schedule for construction of the building.

Watson Gin

Watson Gin

4/18/85

Date

APPENDIX B

Travis AFB Site Description

TRAVIS AFB SITE DESCRIPTIONS

SAMPLE NO.	BLDG NO.	SITE DESCRIPTION	SAMPLE TYPE
0052	141	Tire repair shop at Motor Pool	Grab
0053	141	Old wash rack at Motor Pool	Grab
0054	141	Car wash at Motor Pool	Grab
0055	S41	Age wash rack	Composite
0056	226	Auto hobby shop	Grab
0057	1202	Vehicle wash rack	Grab
0058	872	Roads and grounds	Grab
0059	1300	Area car wash	Grab
0060	619	Base car wash	Grab
0061	808	S.W. Side (fuel systems)	Grab
0062	808	N.E. Side (fuel systems)	Composite
0063	809	S. Side of hangar	Grab
0064	818	N.W. Corner of bldg	Grab
0065	818	W. Side of bldg	Grab
0066	809	N. Side of hangar	Grab
0067	810	S.W. Side across street	Grab
0068	810	Behind hangar	Grab
0069	811	N. Side of hangar	Composite
0070	1001	Test cell	Grab
0071	103	E. Side of 808	Composite
0072	P-18	P-18 Lot separator	Grab
0073	60	Lift station	Composite
0078	919	E. Side (aerial port)	Grab
0079	551	S.E. Side (fuel sys repair)	Grab

APPENDIX C

Parameters Tested For at Travis AFB

PARAMETERS TESTED FOR AT TRAVIS AFB, CALIFORNIA

VOLATILE HALOCARBONS	VOLATILE AROMATICS	METALS
Bromodichloromethane	Benzene	Arsenic
Bromoform	Chlorobenzene	Barium
Bromomethane	1,2-Dichlorobenzene	Cadmium
Carbon Tetrachloride	1,3-Dichlorobenzene	Chromium
Chloroethane	1,4-Dichlorobenzene	Lead
2-Chloroethylvinyl Ether	Ethylbenzene	Mercury
Chloroform	Toluene	Selenium
Chloromethane		Silver
Dibromochloromethane		Boron
Dichlorodifluoromethane		
1,1-Dichloroethane		
1,2-Dichloroethane		
1,1-Dichloroethene		
trans-1,2-Dichloroethene		
1,2-Dichloropropane		
Cis-1,3-Dichloropropene		
trans-1,3-Dichloropropene		
Methylene Chloride		
1,1,2,2-Tetrachloroethane		
Tetrachloroethylene		
1,1,1-Trichloroethane		
1,1,2-Trichloroethane		
Trichloroethylene		
Trichlorofluoromethane		
Vinyl Chloride		

APPENDIX D

Pretreatment Standards for Existing Sources (PSES) From 40 CFR Part 433

PRETREATMENT STANDARDS FOR EXISTING SOURCES

(From 40 CFR Part 433)

PARAMETER	MAX/DAY (mg/l)
181B Cadmium	0.69
Chromium	2.77
Copper	3.38
Lead	0.69
Nickel	3.98
Silver	0.43
Zinc	2.61
Cyanide	1.20
Total Toxic Organics	2.13

APPENDIX E

Fairfield-Suisun Sewer District Wastewater

Discharge Ordinance No. 9, Section 2.08

FAIRFIELD-SUISUN SEWER DISTRICT WASTEWATER DISCHARGE ORDINANCE NO. 9

SECTIONS 2.08.1 AND 2.08.2

LIMITATIONS ON WASTEWATER STRENGTH

Section 2.08.1 - No person shall discharge wastewater containing an excess of:

Arsenic	0.1 mg/l
Cadmium	0.2 mg/l
Copper	2.0 mg/l
Cyanide	1.0 mg/l
Lead	1.0 mg/l
Mercury	.01 mg/l
Nickel	1.0 mg/l
Silver	0.2 mg/l
Chromium	0.5 mg/l
Zinc	3.0 mg/l

Section 2.08.2 - No person shall discharge any wastewater:

a. Having a temperature higher than 130°F

b. Containing more than 300 mg/l of Oil or Grease of animal or vegetable origin

c. Containing more than 100 mg/l of Oil or Grease of mineral or petroleum origin

d. Having a pH lower than 6.0

e. Containing in excess of 0.02 mg/l total identifiable chlorinated hydrocarbons which cannot be removed by the Agency's wastewater treatment process

f. Containing in excess of 1.0 mg/l phenolic compounds which cannot be removed by the Agency's wastewater treatment process

APPENDIX F

Sample Sites With Concentrations Exceeding the PSES Limits and/or the Fairfield-Suisun Sewer District Wastewater Discharge Ordinance No. 9, Section 2.08

SAMPLE SITES WITH CONCENTRATIONS EXCEEDING THE PSES LIMITS AND/OR THE FAIRFIELD-SUISUN SEWER DISTRICT WASTEWATER DISCHARGE ORDINANCE NO. 9, SECTION 2.08 - LIMITATIONS ON WASTEWATER STRENGTH

SAMPLE NO.	PARAMETER	PSES LIMIT (mg/l)	ORD. NO. 9 LIMIT (mg/l)	MEAS. VALUE (mg/l)
0055	Cadmium	0.69	0.20	0.45
0056	Arsenic	none	0.10	.125
0056	Lead	0.69	1.0	4.52
0057	Lead	0.69	1.0	1.71
0061	TTO[1]	2.13	N/A	35.95
0067	Silver	0.43	0.20	1.18
0070	Cadmium	0.69	0.20	0.34
0072	TTO[1]	2.13	N/A	122.6
0072	Lead	0.69	1.0	.745
0072	Chromium	2.77	0.50	9.2
0073	Mercury	none	0.01	2.72
0078	Cadmium	0.69	0.20	0.28
0078	Lead	0.69	1.0	2.79

[1]TTO = Total Toxic Organics

APPENDIX G

Total Toxic Organics

TOTAL TOXIC ORGANICS (TTO)

SAMPLE NO.	MEASURED VALUE (mg/l)
0057	0.11
0061	35.95
0062	0.006
0063	0.005
0064	0.005
0066	0.131
0067	0.005
0068	0.006
0069	1.00
0070	1.63
0072	122.6
0073	0.025
0079	0.006

APPENDIX H

Sample Sites With Detectable Amounts of Volatile Halocarbons and Aromatics in the Wastewater Effluent

SAMPLE SITES WITH DETECTABLE AMOUNTS OF VOLATILE HALOCARBONS

AND AROMATICS IN THE WASTEWATER EFFLUENT

SAMPLE SITE	SUBSTANCE	CONCENTRATION (µg/l)	ORDINANCE NO. 9 LIMIT (µg/l)
0056	Benzene	9.0	N/A
0057	Chloroform	3.3	20
	Methylene Chloride	3.7	20
	Chlorobenzene	7.0	20
	1,4-Dichlorobenzene	103	20
0058	1,4-Dichlorobenzene	6.0	20
0061	Tetrachloroethylene	35800	20
	1,2-Dichlorobenzene	50	20
	1,3-Dichlorobenzene	33	20
	1,4-Dichlorobenzene	65	20
0062	1,2-Dichloroethane	0.7	20
	Methylene Chloride	5.1	20
0063	1,2-dichloroethane	0.7	20
	Methylene Chloride	4.2	20
0064	1,2-Dichloroethane	0.6	20
	Methylene Chloride	4.7	20
0065	Chloroform	20.4	20
	Methylene Chloride	5.3	20
	1,1,1-Trichloroethane	130.8	20
0067	1,2-Dichloroethane	1.1	20
	Methylene Chloride	3.8	20
0068	Chloroform	2.8	20
	Methylene Chloride	3.6	20
0069	Methylene Chloride	1000	20
0070	Methylene Chloride	1500	20
	Benzene	133	N/A
0072	Methylene Chloride	62200	20
	Chlorobenzene	85	20
	1,2-Dichlorobenzene	21500	20
	1,3-Dichlorobenzene	16800	20
	1,4-Dichlorobenzene	22000	20

SAMPLE SITE	SUBSTANCE	CONCENTRATION (µg/l)	ORDINANCE NO. 9 LIMIT (µg/l)
0073	Chloroform	2.0	20
	Methylene Chloride	23.1	20
0079	Bromodichloromethane	0.6	20
	Chloroform	5.1	20
	Methylene Chloride	0.4	20
	Tetrachloroethylene	1.0	20
	1,1,1-Trichloroethane	1.9	20
	1,4-Dichlorobenzene	4.0	20

APPENDIX I

pH, COD, and Oil and Grease Results

PH, COD, AND OIL and GREASE RESULTS

SAMPLE NUMBER	pH	COD (mg/l)	OIL AND GREASE (mg/l)
000052	N/A	120	7.5
000053	8.9	3550	656
000054	N/A	125	4.2
000055	9.04	2000	496
000056	7.2	7500	212
000057	7.03	915	73.6
000058	7.53	220	5.8
000059	N/A	270	30.2
000060	N/A	100	0.8
000061	7.51	120	1.7
000062	7.3	255	21.2
000063	7.12	25	2.9
000064	7.55	20	24.8
000065	7.16	25	0.8
000066	7.16	50	0.8
000067	8.10	280	49.6
000068	8.23	440	84.8
000069	7.64	450	175.2
000070	9.24	2200	1048
000071	7.55	100	6.6
000072	9.67	22500	N/A
000073	6.74	200	38.8
000078	4.96	2250	212
000079	7.12	170	22

APPENDIX J

Oil/Water Separator Data

SEPARATOR DATA

SAMPLE NUMBER	SEPARATOR VOLUME (ft x 3)	FLOW (gal/min)	DESIGN DET. TIME RANGE (min)	ACTUAL DETENTION TIME (min)
0052	15.8	12.2	2.9-11.1	9.71
0053	36.75	12.2	6.2-23.7	45.11
0054	12.2	12.2	3.7-14.1	15.1
0055	75	12.2	3.8-14.5	46.1
0057	1.31	4.94	1.9-7.3	23.85
0058	59.5	12.2	2.8-10.7	37.3
0059	7.38	21.0	2.2-8.5	2.6
0060	8	12.2	1.5-5.8	4.91
0061	341.7	12.2	7.6-29.1	209
0062	341.7	12.2	7.6-29.1	209
0063	326.7	12.2	7.1-27.1	195.7
0064	53.3	12.2	3.0-11.6	32.7
0065	84.4	12.2	4.8-18.4	51.7
0066	338.33	12.2	7.3-28.1	202.4
0069	120	12.2	6.1-23.25	73.5
0071	341.7	12.2	12.9-49.4	1562.5
0072	331	12.2	5.6-21.3	203
0078	7.5	12.2	2.3-8.7	3.1
0079	5.6	12.2	2.3-8.7	3.45

APPENDIX K

Water Solubilities and Specific Gravities of Priority Pollutants

WATER SOLUBILITIES AND SPECIFIC GRAVITIES OF PRIORITY POLLUTANTS

VOLATILE HALOCARBONS	SOLUBILITY	SPECIFIC GRAVITY
Bromodichloromethane	insoluble	1.980
Bromoform	slightly soluble	2.889
Bromomethane	slightly soluble	1.675
Carbon Tetrachloride	insoluble	1.594
Chloroethane	slightly soluble	.8978
2-Chloroethylvinyl Ether	not found	not found
Chloroform	slightly soluble	1.483
Chloromethane	soluble	.9159
Dibromochloromethane	insoluble	2.451
Dichlorodifluoromethane	insoluble	1.183
1,1-Dichloroethane	slightly soluble	1.176
1,2-Dichloroethane	slightly soluble	1.235
1,1-Dichloroethene	insoluble	1.218
trans-1,2-Dichloroethene	slightly soluble	1.257
1,2-Dichloropropane	slightly soluble	1.156
cis-1,3-Dichloropropene	insoluble	1.217
trans-1,3-Dichloropropene	insoluble	1.224
Methylene Chloride	slightly soluble	1.326
1,1,2,2-Tetrachloroethane	slightly soluble	1.595
Tetrachloroethylene	insoluble	1.624
1,1,1-Trichloroethane	insoluble	1.325
1,1,2-Trichloroethane	slightly soluble	1.439
Trichloroethylene	slightly soluble	1.464
Trichlorofluoromethane	insoluble	1.494
Vinyl Chloride	slightly soluble	.9106
VOLATILE AROMATICS		
Benzene	insoluble	.8790
Chlorobenzene	insoluble	1.107
1,2-Dichlorobenzene	insoluble	1.305
1,3-Dichlorobenzene	insoluble	1.288
1,4-Dichlorobenzene	insoluble	1.458
Ethylbenzene	insoluble	.8670
Toluene	insoluble	.8669

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